REMARKS

The Office action of March 31, 2010, has been carefully considered.

Claims 23 and 24 have been rejected under 35 USC 112, second paragraph, in the recitation of multiple ranges. The claims of record have now been canceled and rewritten as new Claims 25-45 which are written in proper form for U.S. practice, without the terminology to which objection has been raised. Withdrawal of this rejection is requested.

Claims 1-5, 8-13, 17-18 and 20 have been rejected under 35 USC 103(a) over Freedman et al in view of Arvidson. In addition, Claims 14-16 have been rejected under 35 USC 103(a) over Freedman et al in view of Arvidson and Nagai et al and Claims 6-7, 19 and 21-24 have been rejected under 35 USC 103(a) over Freedman et al in view of Arvidson and Mackintosh et al.

The sole independent claim in the application is now Claim 25, which includes recitations from original Claims 1, 10 and 13. Thus, new Claim 25 is directed to a process for conveying solid silicon-containing particles of irregular geometry to a silicon melt from which solid silicon is produced by crystallization, comprising the steps of admixing the solid silicon-containing particles of irregular geometry with solid silicon-containing particles of regular geometry, and conveying the admixture by means of a gas through a pipe or pipe system having at least one curve, at least one kink, or both at least one curve and at least one kink.

Freedman et al is directed to a process for continuously replenishing a melt by supplying silicon particles using a gas. Particles are expelled from particle dispenser 80 through pipe 90, into a receiving chamber 82, using a gas. A pipe 60 which leads to the melt extends upwardly from

receptacle 82, and a tube 94 extends downwardly from receptacle 82, connected to a source of gas. The gas from tube 94 conveys the particles upwardly through pipe 60 into the melt.

The silicon particles are disclosed at column 3, lines 61-62 as being spherical, although the use of irregularly shaped silicon particles is also disclosed in the paragraph bridging columns 5 and 6. Freedman et al does not disclose or suggest forming a mixture of such particles.

According to Freedman et al, silicon particles are transported through two pipes, pipe 90 and pipe 60. Both pipes are straight; neither has a kink or a curve.

Tube 94 does have a bend, but it is not used for transporting silicon particles.

Since neither pipe 60 nor pipe 90 includes a kink or a curve, no difficulty would be expected in transporting either particles of regular geometry or particles of irregular geometry. Moreover, note that in the paragraph bridging columns 5 and 6, Freedman et al discloses that particles having length to width ratio L/D ranging from about 1 to 1.2 can be satisfactorily employed in this system. Even without kinks or curves in the pipes, the system of Freedman et al is quite limiting given that long thin particles could have a ratio of L/D equal to 5 or more, as disclosed at column 6, lines 5-6.

Applicants have discovered that it is possible to transport silicon particles of irregular geometry through a pipe system including kinks and curves by mixing the particles of irregular geometry with particles of regular geometry. Present Claim 32 recites that it is possible to utilize this process for particles having a length to width ratio up to about 3, which is, of course, much greater than the L/D radio disclosed as functioning satisfactorily in the system of

Freedman et al.

The Arvidson patent discloses a method of stacking polycrystalline silicon in a crucible in a process for producing single crystals. To achieve a high packing density, polygonal-shaped polycrystalline silicon pieces are arranged at the bottom of the crucible, and the clearances between the pieces can be filled with irregularly shaped pieces of polycrystalline silicon. While Arvidson may disclose that mixtures of differently shaped silicon particles may be useful for a specific purpose, one could not obtain such an arrangement of particles by admixing the different types of particles, and then using the dispenser of Freedman et al. To the contrary, to obtain the arrangement disclosed in Arvidson, one must place the rod shaped crystals in the crucible first.

Accordingly, Arvidson provides no motivation for one of ordinary skill in the art to mix particles of regular geometry with particles of irregular geometry in the Freedman et al system.

Thus, there is nothing in the combination of cited references which would lead one of ordinary skill in the art, when conveying irregularly shaped silicon particles through a pipe system with a curve or a kink, to admix the irregularly shaped particles with regularly shaped particles, thereby avoiding blocking of the curved or kinked pipe. It is only Applicants who teach that such a mixtures enables the passage of irregularly shaped particles through a pipe system with a curve or a kink.

The Nagai et al reference has been cited to show a method of manufacturing silicon monocrystals by the Czochralski method, in which granular silicon materials fed into a crucible tube via feed pipe 10. The feed pipe is straight, without kinks or curves.

The Mackintosh et al reference is directed to crystal

growth by the EFG method, in which the silicon particles are conveyed to a silicon melt via a straight pipe. Kinks and curves are also not disclosed in this reference.

Withdrawal of these rejections is requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,

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